Swansea University
Prifysgol Abertawe

Advanced Structural Analysis

EGF316

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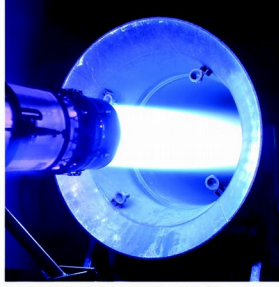

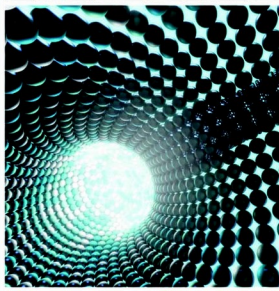
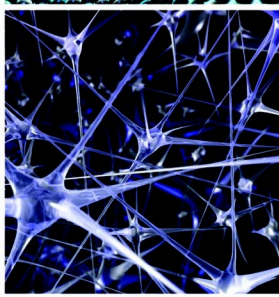


Module Synopsis

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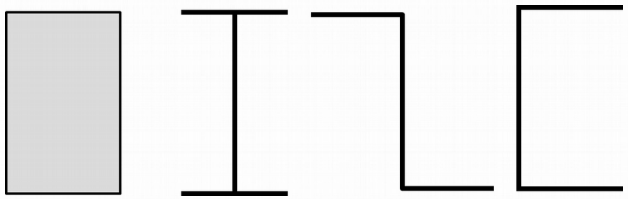
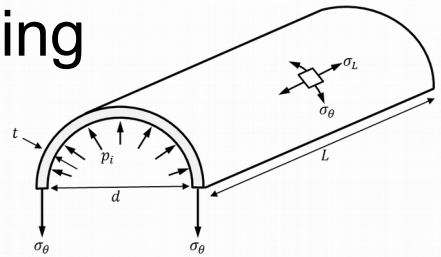
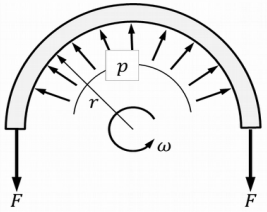
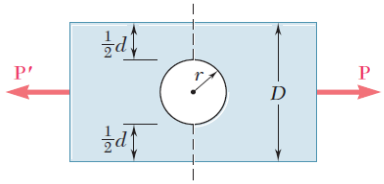
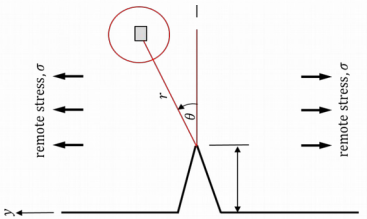
- Basics of Stress and Strain
- Beam bending
  - Section properties
  - Symmetrical and Unsymmetrical bending
- Stresses in cylinders
  - Thin, Thick and Composite cylinders
- Stresses in rotating discs
- Theories of failure
- Stress concentration effects
- Fatigue
- Linear Elastic Fracture Mechanics (LEFM)











Learning Outcomes

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By the end of this module, you should be familiar with:

- Calculating section properties
- Unsymmetrical bending
- Calculating stresses in cylinders and rotating discs
- Theories of failure, fatigue and fracture.

- An understanding of stress concentration factors and their effects on design.
- An ability to identify sources and types of stresses and stress concentrations in structures under various loading regimes

Reading List

D.W.A.Rees
The Mechanics of Solids and Structures
McGraw-Hill, 1990

E.J.Hearn
Mechanics of materials 1 – An introduction to the mechanics of elastic and plastic deformation of solids and structural materials
Butterworth-Heinermann, 1997

E.J.Hearn
Mechanics of materials 2 – An introduction to the mechanics of elastic and plastic deformation of solids and structural materials
Butterworth-Heinermann, 1997

Module Delivery

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- Five 3-4 hour lectures; **every other Wednesday**
- Theory followed by worked examples
- Tutorial/problem set with worked solution posted on Blackboard
- Lecture notes will be placed on Blackboard and my personal website.
- Past exam papers will be placed on Blackboard at appropriate times

Teaching Plan

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Week 2 – Stress and Strain
– Stress and Strain Relationships
Week 4 – Section Properties and bending
– Thin and Thick Cylinders
Week 5 – Compound Cylinders
– Rotating Discs
Week 8 – Theories of Failure, Stress Concentrations
– Fatigue
Week 10 – Linear Elastic Fracture Mechanics
– Summary and Revision

Module Assessment

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Examination

- Closed book examination
- Data/Formula sheet will be provided
- 100% of module

Note: The College of Engineering has a ZERO TOLERANCE penalty policy for late submission of all coursework